Welcome to the South Treatment Plant in Renton, Washington

The South Treatment Plant is part of King County's regional system that treats wastewater for about 1.4 million people in the Puget Sound region. Every day, South Plant treats about 75 million gallons of wastewater from our region's homes, businesses and industries.

The Treatment Process:

- Preliminary treatment to remove large sticks, rocks, and rags
- Primary treatment, where skimming and settling remove about 60 percent of the solids and pollutants
- Secondary treatment, the biological treatment that consumes and removes an additional 30 percent of the pollutants
- Solids handling that uses an anaerobic digester process to stabilize solids, reduce pathogenic microorganisms, and produce biogas
- Resulting biosolids used for agricultural land application, forestry and composting
- Resulting wastewater (secondary effluent) disinfected and discharged to Puget Sound.
- Production of water for reuse at the Fort Dent Park as well as on-site.

Alternative formats available

206-684-1247 or 711 (TTY relay)

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Project Partners

Costs of the South Treatment Plant Fuel Cell Demonstration Project are shared by FuelCell Energy and King County. The U.S. Environmental Protection Agency is providing federal funding estimated at $12.5 million to King County through annual cooperative agreements. The total value of the project is $22 million.

CH2M Hill and Brown and Caldwell are providing engineering assistance to King County. They are responsible for assisting King County in coordination and management of the overall project.

King County

FuelCell Energy

FOR MORE INFORMATION

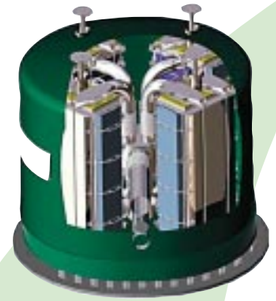
King County

Department of Natural Resources and Parks
Wastewater Treatment Division
Planning and Compliance Section

Fuel Cell Demonstration Project
201 South Jackson Street, Suite 512
Seattle, WA 98104-3855
206-684-1164 or 711 (TTY relay)
http://dnr.metrokc.gov/wtd/fuelcell/

FuelCell Energy:
www.fce.com

King County
Department of
Natural Resources and Parks
Wastewater Treatment Division



Cutaway view of fuel cell module

Fuel cell power plant being tested in Connecticut

Groundbreaking ceremony April 2003: from left, U.S. Senator Maria Cantwell, King County Executive Ron Sims and Renton City Council President Kathy Keolker-Wheeler

King County Fuel Cell Demonstration Project

King County is leading the wastewater industry with innovative ideas for clean energy…

Working with the U.S. Environmental Protection Agency and FuelCell Energy Inc., King County is sponsoring the world's largest demonstration project of a single unit fuel cell power plant. Using biogas from King County's South Wastewater Treatment Plant in Renton, Washington, this fuel cell will produce up to 1 megawatt (MW) of electricity—or enough to serve 1,000 households—to meet some power needs at the plant.

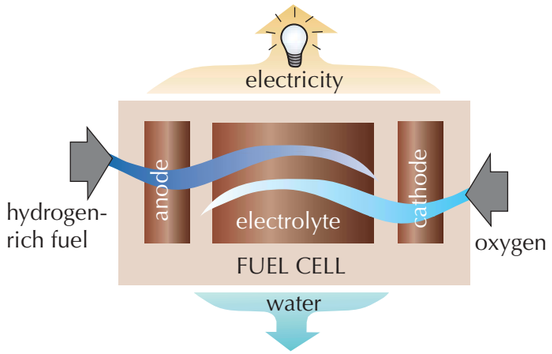
King County's Wastewater Treatment Division has been proactive in its energy management. It now scrubs biogas generated in the digesters to pure natural gas and sells it to Puget Sound Energy. The South Treatment Plant's biogas supply can generate about 4 MW of electricity. The fuel cell will use biogas more efficiently than the current gas scrubber.

Breaking ground for the project: from left, Stephen Torres, Western Region Vice President of FuelCell Energy Inc.; Kathy Keolker-Wheeler, Renton City Council President; Ron Sims, King County Executive; Maria Cantwell, U.S. Senator; and Don Theiler, King County Wastewater Treatment Division Director

WHAT IS A FUEL CELL?

Fuel cells are an emerging technology for the efficient, clean generation of electrical power from natural gas or other types of hydrogen-based fuels.

How Does a Fuel Cell Work?



Fuel cells are electrochemical devices that efficiently convert chemical energy in a hydrogen-rich fuel to electrical power and heat.

Similar to a battery, a fuel cell has many individual cells. Cells are grouped to form a stack. Each fuel cell contains an anode, cathode and electrolyte. A hydrogen-rich fuel, such as digester gas and oxygen, enters the stack and reacts with the cells to produce electric current.

While a typical battery has a fixed supply of energy, fuel cells are like large continuously operating batteries that generate electricity as long as fuel, such as natural gas, is supplied.

Since the fuel does not burn, there is no pollution commonly associated with the combustion of fossil fuels. Because the fuel cell generates hydrogen directly from readily available natural gas and wastewater treatment gas, the power plants are ready today and do not require new facilities for providing hydrogen.

Types of Fuel Cells

There are six major types of fuel cells. They can be used for mobile (car), portable (phones or handheld computers) and stationary (power plant) power production. Stationary fuel cells can efficiently generate clean electricity at locations near the customer, including hospitals, schools, universities, hotels, and other commercial and industrial facilities.

King County's South Treatment Plant will use a molten carbonate fuel cell, or MCFC. MCFCs are expected to be 50 percent more efficient than phosphoric acid fuel cells, another type of fuel cells in use at several other wastewater treatment plants, including Yonkers, N.Y.; Portland, Ore.; and Boston, Mass.

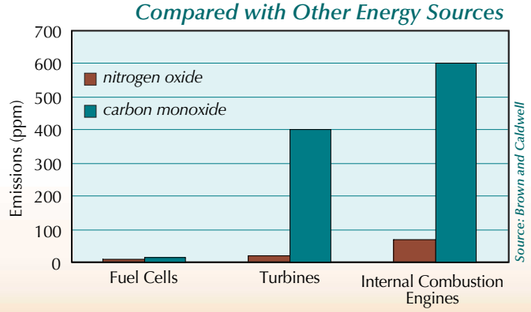
Just entering commercial markets, molten carbonate fuel cells offer greater fuel flexibility and higher fuel-to-energy efficiencies than lower-temperature fuel cells. The higher operating temperatures of MCFCs make them candidates for applications in which the exhaust heat generates additional electricity. When the waste heat is used for cogeneration, total thermal efficiencies can approach 80 percent.

FuelCell Energy has generated more than 7 million kilowatt hours at customer locations worldwide, including sites in Germany, Japan and the United States.

Research and development is under way to increase the fuel flexibility of fuel cells. Topics include the following:

- nontraditional fuel storage (hydrogen)
- transportation fuel reforming
- renewable fuels processing (reforming, gasifying, cleanup)
- biogas operation (the South Plant project)
- tolerance to gas supply variation (the South Plant project).

Fuel Cell Emissions Compared with Other Energy Sources



WHY USE FUEL CELLS?

- ✓ Highly efficient energy generation
- ✓ Extremely low air emissions
- ✓ Power production at the consumer without transmission wires
- ✓ Cost-competitive as manufacturing advances

The South Plant Fuel Cell Demonstration Project

Increasing energy costs and heightened regulation of air emissions are driving King County to search for new and innovative ways to provide electricity for its wastewater treatment plants. Fuel cell technology has the potential to improve the efficiency of recovering energy from digester gas. It will also greatly reduce air emissions, including greenhouse gases, released from the South Treatment Plant.

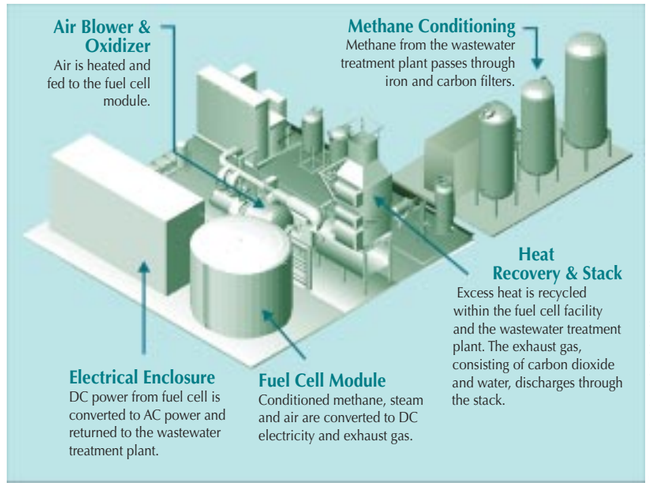
The fuel cell demonstration project will install and operate a Direct FuelCell® power plant built by FuelCell Energy Inc., sized to produce 1 megawatt (MW) of power for two years. The project will be operated to demonstrate the feasibility for using this technology at wastewater treatment facilities. The project will also verify the claims of high-energy conversion efficiencies and low air emissions for fuel cells.

If the demonstration project is successful, full-scale fuel cells could be cost-effective for providing a portion of the electricity used at the South Treatment Plant and other municipal wastewater treatment systems. In the United States alone, 400 treatment plants generate enough digester gas to supply stationary fuel cell power plants producing at least 1 MW.

This project will provide operational experience for this type of fuel cell power plant operating on digester gas, and it will pave the way for future fuel cell installations at other treatment plants.

Source: King County Fuel Cell Web cam

Fuel Cell Demonstration Project Site at the South Treatment Plant



Source: Brown and Caldwell

One MW Fuel Cell Power Plant

PROJECT TIMELINE